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Wien Effect on a Lattice VOJTECH KAISER, Max Planck Institute for the Physics of Complex Systems / ENS Lyon, STEVEN BRAMWELL, London Centre for Nanotechnology / University College London, PETER HOLDSWORTH, ENS Lyon, RODERICH MOESSNER, Max Planck Institute for the Physics of Complex Systems — The Second Wien Effect is an increase of conductivity of Coulomb gas in an external field, driven by enhanced dissociation of Coulombically bound pairs. The importance of the Wien effect for spin ice was suggested previously since spin ice maps to a Coulomb gas of magnetic monopoles. We present simulations of a lattice Coulomb gas and spin ice. The results confirm Onsager's theory of the Wien effect and reveal additional corrections, while allowing access to microscopic dynamics underlying the increase in the charge carrier density. Main extensions of the original theory involve the Debye screening, field dependent mobility and the character of the association constant. We discuss further corrections specific to spin ice due its emergent topological charge and Dirac string network.

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